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TUBERCULAR ARTHRITIS

of the

SACRO-ILIAC SYNCHONDROSIS,

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by

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I N D E X .

I N T R O D U C T I O N .

The title has been given in preference to the customary one of "Sacro-iliac Disease," as there is in the latter no indication of the pathological nature of the articular lesion.

In the subsequent discussion, except in so far as the differential diagnoses of affections of this joint are concerned, reference has only been made to those conditions which are believed to be of a tubercular nature. Such conditions as Rheumatic Inflammation, Gonorrhoeal Synovitis and the Subluxation of pregnancy and the puerperium, are not discussed in detail, but are referred to incidentally.

A short history of disease of the sacro-iliac joint is given the first place, by which is shown that the increased mobility of the joint during pregnancy was known to the Ancients; while the recognition of the true tubercular affection is only

of recent date and synchronous with the development of modern pathological investigation. The etiology, pathology, diagnosis, and treatment are then discussed, and in conclusion a number of cases gleaned from contemporary literature are recorded, to which have been added the details of two original cases occurring in the author's practice.

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H I S T O R Y .

The first mention of disease of this joint was made by a French surgeon, Boyer, in an article entitled "De la carie des os du bassin" in "Traité des maladies chirurgicales" published in Paris in 1822. He has also another article in the same publication entitled "De l'ecartement des os du bassin." He describes the condition as "caries affecting the pelvic aspect of the sacrum which causes purulent collections to show at some distance." He states as causes external violence, and the ligamentous relaxation which occurs in females in course of gestation, and suggests the cautery as a means of treatment, as "nature seldom effects a cure."

As early as 1774, Louis reported an observation by Phillippe of Chartres in the "Memoires de l'Academie de chirurgie," on Diastasis of the bones of the pelvis, and gives a case of a man who, having received on the back a sack of corn weighing 350 lbs.

was immediately taken with a sharp pain at the level of the hip, developed feverish symptoms and died in 20 days, and at the post mortem examination the right sacro-iliac synchondrosis was found to be disjointed, inflamed and full of pus.

In the days of Hippocrates separation of the bones of pelvis in pregnant women was a well known condition. But Boyer is essentially the first to mention the true disease of the sacro-iliac synchondrosis. He inclines towards scrofula as the common predisposing cause.

So that we may say that tubercular disease was practically unknown before the 19th century. As early as 1824 Velpeau mentions some genuine cases.

Larrey lectured on the subject and his lectures were published in Cliniques Chirurgicales in 1829. In 1833 Langier wrote upon the subject in the "Dictionnaire Encyclopaedique des sciences médicales" in an article entitled "Tumeurs blanches des articulations du bassin." In the same year Hahn wrote

"Ueber die Coxalgie" in "Allgemeine medicinische Zeitung," published in Stuttgart in October of that year. There was also an article in the "Dictionnaire Encyclopaedique des sciences médicales," by Cloquet and Berard on "Carie des os du bassin" in 1864.

Frère wrote a Thèse for graduation in Paris in 1838 on the diagnosis between Sacro-Caxalgie and Hip-joint Disease and the treatment of the former. He was followed by two others who wrote Thèses with practically the same titles - Giraud de Nollac in 1840 and Delineau in 1842. After an interval of ten years, during which articles on the subject appeared by Maisonneuve in 1844 and Nelaton in 1847, another Thèse was written by Hattute in 1852 entitled "De l'arthropathie sacro-iliaque." Then Gurlt in Berlin and Crocq in Brussels both wrote upon it in 1853, and Guéniot in Paris in 1858. Up to this time, however, no satisfactory account had been written, and it was reserved for an English surgeon to give the first systematic description of the disease.

Erichsen, in a lecture delivered at University College, London, in 1859, detailed the signs and symptoms of sacro-iliac disease, and the description which he then gave has been adopted by almost all subsequent authors. He there entered fully into the differential diagnosis. Then Boissarie presented a Thèse for graduation in Paris in 1862, and Velpeau and Duplay wrote upon the subject in 1868. There was an article on it in Holmes' System of Surgery published in 1870. Then Delens presented an excellent graduation Thèse on the subject in 1872, and gave in that several interesting cases. Bounaix wrote a short Thèse in 1874 with a full account of four cases, and in the same year Mason gave an account of a post mortem examination before the New York Pathological Society, which was published in the Medical Record of that city. In 1876 Heath gave a clinical lecture at University College on this condition and brought forward a special treatment. In 1878 Poore published in the American Journal of Medical Sciences a paper, giving various

statistics in connection with Sacro-iliac disease, but unfortunately, the statistical account embraced every variety of cases, Tubercular, Rheumatic, Gonorrhoeal and Puerperal.

In 1879 Sayre gave a clinical lecture in which he mentioned eighteen cases with only one death. In 1880 Wood wrote an article on the employment of double extension as a treatment for these affections. In 1883 Tiling of St. Petersburg gave an account of four cases, two of which were operated upon. In 1886 Marsh gave a good description in his Diseases of Joints. The following year Gant published two cases in the Lancet. In 1888 Van Hook published a long and interesting article on the subject in the Annals of Surgery, in which he gave an account of Sayre's first operations, the first one being performed in 1853, and a second one in 1863. In 1889 Collier published in the Lancet an interesting account of a case in which he operated with success. In 1890 and 1891 Benjamin Lee published cases in the Transactions of the American Orthopaedic Association . In 1892

Makins read a paper before the Clinical Society of London on the prognosis of this affection and quoted from various authors. In 1893 Ridlon and Jones wrote in the Annals of Surgery condemning operations, and in the same year Beale published a case in the Lancet.

In 1895 Golding Bird strongly recommended early excision of the joint in a paper read before the Clinical Society of London. In 1896 Naz presented a complete graduation Thèse and at the end of the same year a case and remarks were given by Judge Baldwin in the British Medical Journal.

This practically represents all the literature on the subject.

E T I O L O G Y .

Among the earlier writers parturition was recognised as a fruitful source of sacro-iliac disease, while Rheumatism and Gonorrhoea were only mentioned by later observers. But to Boyer is due the credit of recognising the tubercular causation.

M. Duplay admitted of only two causes - Tuberculosis and parturition; but under the latter sub-division he included subluxations of the joint. More recent authors, as Chauvel, have condemned this classification, but have admitted parturition as a cause of the true sacro-iliac disease. These only are regarded as of puerperal nature where it can be shown that a tubercular arthritis was started in the joint during labour.

There can be no doubt that the vast majority of cases are tubercular in their origin and it is only those cases that it is proposed to deal with here.

In a large number of cases there is evidence of a tubercular constitution, and then of injury; but whether traumatism alone may cause the condition without a tubercular basis, is a doubtful point, although Sayre has stated that an injury alone is sufficient to cause disease of the joint.

The various causes mentioned may be classified thus:-

1st. Traumatism.
2nd. Parturition.
3rd. The tubercular diathesis.

1st. Traumatism.

That injury may act as an excitant of the disease there is little reason to doubt. In one original case to which reference will, later on, be made (vide Case No. II page 63), there was distinct evidence of injury, and the same evidence is found in the history of many of the recorded cases.

Chauvel attributed the disease amongst cavalry soldiers to injury caused by horse-riding; and this appears a highly probable cause of strain upon the joint from the method of sitting, by

which the rider receives a succession of jolts against the saddle. These act upwards in the sacro-iliac joint, from the iliac to the sacral surfaces, at the same time that the force of gravity is acting downwards from the sacrum to the ilium.

Lee related three cases in all of which there was distinct evidence of injury from a fall.

Heath, Fagan, Barker, Marsh and Moullin have all admitted the possibility of the disease being caused by traumatism.

2nd. Parturition.

The next tabulated cause is parturition. A limited number of cases have been recorded in which a true arthritis has been set up immediately after accouchement.

Poore has related a case in which both the patient and the medical attendant, who had applied the forceps, heard a distinct crack which was followed by intense pain in the sacro-iliac joint with swelling and the formation of abscesses.

3rd. Tubercle.

The Tubercular Diathesis is the next cause to be considered.

Authors from the time of Boyer have admitted this as the principal cause. Unfortunately the tubercle bacillus has not yet been demonstrated in any case. Nevertheless the appearances presented by the joint at post-mortem examination have been those characteristic of tubercular disease in other joints.

It is to be regretted that Poore in his statistics of 57 cases did not specify the nature of the inflammatory affection, whether Tubercular, Gonorrhoeal, etc. Of the 30 males, in 12 of them no cause was assigned, 5 were due to injury, 1 to a strain caused by lifting a heavy weight, 4 to gonorrhoea, 1 to rheumatism, 5 were secondary to Pott's disease, 1 followed measles, and 1 was assigned to "cold." Of the 27 females, in 12 of them no cause was assigned, 11 were due to puerperal conditions, 2 to injury, 1 to the strain of lifting a heavy weight, and 1 followed continued fever.

Of the 11 puerperal cases, 5 followed tedious confinements due either to a large head or to a contracted pelvis, in 3 cases pyaemic abscesses were found in the sacro-iliac synchondroses, 1 was secondary to Phlegmasia Alba dolens, 1 was after uterine Phlebitis, and 1 after phlegmasous inflammation of the pelvic fascia. A last case was due to injury by forceps. (See page 11)

Analyses of those cases show 24 in which no cause was assigned. In other words, they were probably idiopathic tubercular affections of this joint.

The 7 cases attributed to injury were probably also of a tubercular nature. The two cases mentioned as being due to the strain of lifting a heavy weight practically come under the same category as those due to injury, and may therefore be classed as tubercular. The 5 cases due to Pott's disease were undoubtedly tubercular.

The earlier authors mentioned other causes. Velpeau and Chauvel believed in the direct effect of "cold."

It has been mentioned as having occurred after Measles and other eruptive fevers, and Marsh related that he had seen a case occur in the course of Typhoid Fever.

Any definite classification of the causes of this condition seems arbitrary, as, in the case of a large number of the patients treated without operation, there has been no conclusive proof of the cause.

F R E Q U E N C Y .

All English authors are agreed in saying that this disease is rare, but Sayre says that the disease is common in America. Certainly he seems to have had a much larger percentage than English surgeons. Why the disease should be more prevalent in America than other countries it is difficult to say.

Barker says that in the ten years from 1871 to 1880 inclusive only 13 cases occurred in University College Hospital.

Makins says that in the ten years from 1881 to 1890 inclusive, only 13 cases had occurred in St. Thomas' Hospital, out of a total of 1622 joint cases, and Marsh states that out of 1000 cases seen at the Alexandra Hospital for Diseases of Hip he only saw 3 or 4 cases of Sacro-iliac Disease. Gant says that he saw 4 cases in 34 years at hospital.

So that there can be no doubt that the proportion of cases of Sacro-iliac Disease to diseases of other joints is small, and also from these statistics the disease is shown to be rare.

F. D. Bird stated, in the Australian Medical Journal in 1887 that "the disease must be a rare one from the passive nature of the articulation, the absence of any synovial membrane worth the name, and generally the very limited movement, if any, allowable, and the presence of a substance so inactive and un-impressionable as the ear-shaped cartilaginous plate; a joint whose function is one of passive weight-bearing solidity, is much less liable to inflammation of its component parts than one endowed with free mobility in addition to having to bear weight; there are no bursae in connection to afford a starting point and but little external pressure is excited upon it in ordinary life."

This joint must, from its anatomy and also from its passive nature, be less subject to disease than those joints which are so commonly the seat of tubercular arthritis.

The greatest strain put upon the joint is in the standing and sitting postures, as the whole weight of the vertebral column is transmitted through these two joints, as well as the head and arms.

SEX.

Out of Barker's 13 cases in University College Hospital 5 were males and 8 females. Of the 13 cases related by Makins as occurring in St.Thomas' Hospital, 6 were males and 7 females. Poore gave a list of 57 cases, of which 30 were males and 27 females.

Out of 82 cases collected, 50 were males, 30 females and two were not stated. The disease therefore seems to be fairly equally distributed between the two sexes. The male sex are, from the nature of their employments, more liable to injury, but the females, on the other hand, are more liable to injuries to the joint during parturition.

AGE.

The disease is generally one of early life. Velpeau says that "this disease is met with at all ages, in the young and the old, in the town practice, and in that of the hospital, in the rich and in the poor." Barker gives the limits of age as 15 to 52 and the average age as 27. Erichsen and Delens say that it is usual between 20 and 35 years of age. Ridlon and Jones put limit of ages at 17 and 30. Of the 13 cases related by Makins, 2 occurred between 5 and 10 years of age, 4 between 10 and 20; 4 between 20 and 30; 1 between 30 and 40, and 2 between 40 and 50.

Poore says that out of 58 cases, 7 occurred under 10 years of age, 7 between 10 and 20, 18 between 20 and 30, 7 between 30 and 40, 5 between 40 and 50, 12 in adults, exact age not given, 1 occurred over 60 years of age, and the age of 1 was not given at all. The youngest was 4 years old and the oldest 61.

Marsh has stated that the usual limits of age are 15 and 35 years.

The average of the 82 cases mentioned under "Sex" was 24½, the youngest being 2½ and the oldest 61.

13 cases occurred under 10 years of age, and 13 between 10 and 20; 26 occurred between 20 and 30; 12 between 30 and 40; only 1 between 40 and 50; 2 between 50 and 60, and 2 over 60.

Van Hook stated that out of 32 cases, 3 occurred under 5 years of age, 2 between 5 and 10; 2 between 10 and 15; 7 between 15 and 20; 12 between 20 and 25; 1 between 25 and 30; 1 between 30 and 35; 1 between 35 and 40; 1 at 45; 1 at 55; and 1 at 61.

P A T H O L O G Y .

The morbid conditions peculiar to Sacro-iliac Disease depend on the stage at which the disease has arrived.

The pathology of this disease is not known in its earliest stage, as no post mortem has, so far, been made. This would necessitate the patient being carried off by some other complaint. One would like to know whether the disease starts in the synovial membrane, which is, in the case of this joint, very imperfectly developed, in the cartilage which separates the two bones, or in the bones themselves? If in the bones, does the disease start in the ilium or in the sacrum?

Boyer said in 1822, that the disease was first apparent on the pelvic aspect of the sacrum.

Erichsen, in 1859, said that he believed the disease was entirely of synovial and cartilaginous origin, and showed, at a clinical lecture, a pathological specimen in which there was neither caries nor necrosis of the bones, although both were bare and roughened, and deprived of their encrusting cartilage and synovial membrane, but there were no deep erosions, no signs of tubercular infiltration and no evidence of primary osseous disease,with the ligamentous structures only partially destroyed. Chauvel, in the "Dictionnaire Encyclopaedique des sciences medicales," stated that the lesions to be found in disease of the sacro-iliac joint are identical with those which characterise white swellings in general. He says that the alterations start from the synovial membrane, which is injected, swollen, secreting a moist abundant liquid, and, later on, covered with granulations. The cartilages, at first softened and infiltrated with liquid, are not long in being destroyed more or less completely.

The ligaments in their turn are dissolved and disappear, principally the periarticular fibrous tissue, less resistant than the interosseous bundles, and from this the possibility of abnormal movements during life is sometimes stated. The periosteum and the neighbouring bone are generally profoundly altered. The periosteum is raised and separated by pus. The sacrum,more often than the iliac bone is denuded, superficially softened, with caries or necrosis. In the foci of suppuration are little sequestra. There are osteophytes formed at the circumference of the articulation, and often a complete osseous welding of the articular surfaces, which brings about deformities of the pelvis if it is produced at an early age. When suppuration occurs, as it usually does, the pus, at first secreted in the articulation or in its neighbourhood, gives rise, it may be, to one solitary patch, or, it may be, to many isolated abscesses.

The above has been translated from the Encyclopaedia as it gives an excellent insight into the pathology of the condition.

Barker mentioned a case in which the abscess was proved to have originated in a small focus of caries of about one inch in length.

Marsh stated that "it is a chronic process of inflammation, inactive, tedious and slow, in some cases complicated with phthisis."

Ridlon and Jones stated that it may commence in either bone or in their neighbourhood, but more commonly in bones than other structures.

Naz mentions that in a case of Trelat's, and in three cases of Delorme's, the iliac bone was first affected, but that Delbet says that he believes that in his two cases the sacrum was the first to be attacked, the spongy tissue becoming soft and full of large spaces, in which are granulations; the vessels became thrombosed, diminishing the blood supply, and so causing death of the bone; sequestra are frequently formed. These sequestra may pass through abscesses to the exterior, or may pass by the rectum.

There would appear then to be considerable difference of opinion as to the structure in which the disease originates. Erichsen says that the cartilages are soon destroyed, undergoing pulpy degeneration, and that the synovial membrane, such as it is, soon goes also, but that the ligaments last much longer. The specimen which Erichsen showed was very conclusive of his statements, and in those cases shown by others to have had carious or necrosed bone, the synovial membrane and cartilage have always been destroyed, at least one feels inclined to presume so from the fact of there being no mention of them in many of the cases. A very strong point in favour of the synovial origin of the disease is the fact of so many recoveries taking place by rest alone. The synovial membrane is very slightly developed in this joint, and the amount of movement permitted to it is also extremely slight. But we cannot imagine that if disease should start in the bone, especially so spongy a bone as the sacrum, that the disease could be cured by rest alone.

Rest alone is not sufficient to cure disease in other joints where the origin is of a synovial nature, but in these cases the synovial membrane is a much more highly developed structure than in the case of the sacro-iliac joint.

The probability is then that the disease originates in the synovial membrane, that the cartilage is then attacked, and that lastly the bones are affected. This would then account for the fact that in the majority of instances it has been found at post mortem examinations, that the sacrum is the involved bone,because, owing to the sacrum being a much more spongy bone than the ilium, the disease spreads in that direction. In those cases in which the ilium is found involved and not the sacrum, most probably the disease has originated on the iliac or outer side of the articular cartilage and has spread to the neighbouring bone before it penetrated the cartilage.

In time all the structures of the joint become involved.

The synovial membrane becomes swollen and injected and covered with granulations.

The cartilage is soon destroyed and undergoes pulpy degeneration,as Erichsen expressed it.

The bones may, at a later stage, produce osteophytes which tend to the formation of new bone with the result that the articular surfaces of the two bones become so welded together as to make them appear as one bone, but the more common result is, in the vast proportion of cases which are not treated in their early stage, that abscesses form which burrow in various directions. Poore stated that 9 cases out of 11 had abscesses.

These are the two principal results which happen in cases of severity, namely, Ankylosis or abscess.

Ankylosis is the great aim of treatment, and as the joint is one in which there is very little movement, the ankylosis does not interfere to any appreciable extent with the ordinary

powers of locomotion when a cure is effected. In the second of the original cases recorded (see page 63) the presumption is that there is now ankylosis, and the patient can walk as much as ten miles without much difficulty.

It would be interesting to know, however, what effect ankylosis would have in a future labour, as there is no such fact recorded among the various treatises on the subject. Naz suggests the possibility of women with Naegele or Roberts pelvis being the possessors of ankylosed sacro-iliac synchondrosis, the result of arthritis.

The more common result of the disease, however, is abscess, judging from the literature on the subject, a few examples of which it will be well to recall here.

Boyer stated that the disease "caused purulent collections which show at some distance generally, and often open at the margin of the anus, with all the dangers common to abscesses of that kind."

Erichsen stated that abscesses appear:-

(1) Over the articulation itself, or

(2) In the gluteal or lumbar regions, or

(3) Within the pelvis in various ways, or

(4) In connection with the rectum.

The abscess swelling may spread outwards to the gluteal region, or stretch upwards to the loin, upon and above the iliac crest. The intra-pelvic abscesses may take one of the three directions mentioned here, viz.,

(1st) Pass out of the sciatic notch, under the gluteal muscles, or

(2nd) Gravitate down into the ischio-rectal fossa and present at the side of the rectum, or

(3rd) Open into the gut and discharge per rectum.

Heath recorded an instance of a case of sacro-iliac disease with abscess, in which he was unable to arrange to operate at the time, and in the interval the abscess opened spontaneously, and the patient was perfectly well after.

He gave the three positions of the abscess as:-

(1st) Forming in the iliac region, or

(2nd) Forming in the sacral region, or

(3rd) Taking the place of the psoas muscle.

Barker recorded a case in which, after death, he traced the abscess backwards along the pyriformus muscle, through the great sacro-sciatic notch, and then upwards to the front of the sacro-iliac synchondrosis.

Van Hook stated that out of 55 cases with abscess, 21 were extra-pelvic and 34 intra-pelvic. Of the 21 extra-pelvic abscesses, in 18 the pus made direct for the surface, in 2 it pointed in the lumbar region, and in 1 in the gluteal region. Of the intra-pelvis abscesses, 4 dissected up to the lumbar region, 18 followed the course of the ilio-psoas muscle down to be embedded in the muscle sheath and to point near the insertion of the muscle, and 12 seemed to travel directly downwards either,

(1st) To pass through the great sacro-sciatic notch, then

(a) To point over the gluteus maximus or

(b) To appear in the posterior aspect of the thigh, or

(2nd) To perforate the rectum, the perinaeum, or the anus.

Ridlon and Jones stated that the pus may take various directions, viz:-

1st. Through the anterior ligament, outside the pelvic fascia and follow,

a. The course of the sacral nerves and pyriformus muscle through the great sacro-sciatic foramen and form an abscess under the gluteus maximus, or

b. The curve of the sacrum behind the rectum, and in the ischio-rectal fossa, causing inflammation and adhesion of the rectum and then bursting into it, or

c. Under the lumbo-sacral ligament into the psoas muscle then into the thigh, or

d. Into the iliacus muscle then into the groin.

2nd. Through the back part of the joint into the multifidus spinae, along it, and point in the lumbar region, or over the joint itself.

In many cases recorded there were two abscesses, one under the skin and one under the muscles.

S I G N S and S Y M P T O M S .

These are Pain, Swelling, Lameness, Alteration in the shape of the limbs, and Abscess.

The Clinical History of this affection might be divided into three stages, viz:-

1st. The stage of pain and slight lameness.
2nd. The stage of swelling and increased lameness, and
3rd. The stage of abscess.

PAIN. In the first stage pain is the principal symptom. The other symptoms which occur are more secondary results of the pain than special symptoms, as the patient unconsciously adopts such an attitude, and walks in such a way as will most relieve the pain.

The pain may be in various positions, and take different courses:-

1st. Directly over the sychondrosis.
2nd. In the iliac fossa.
3rd. At the back of the thigh.

4th. In the front of the thigh.

5th. At the knee.

6th. In the buttock.

7th. In the abdomen.

8th. At the symphysis pubis.

Pain directly over the sacro-iliac sychondrosis of the affected side is perhaps one of the most common seats. But referred pains also occur frequently, and tend to error in diagnosis. It varies much in intensity, from a slight tingling to the most agonising pain which compels the patient to cry out and prohibits all possibility of natural sleep.

It seems possible that where a nerve is injured in the pelvis, a neuritis may result, and trophic changes ensue in the muscles supplied by that nerve, though Heath says that the wasting of the muscles is simply a result of disease, and not a necessary symptom of it.

The pain varies much according to the position or attitude of the patient. Walking, standing, and even sitting usually aggravates it, and it is only in the recumbent posture that

the patient obtains relief, if at all. This is apparent on consideration of the fact that the entire weight of the spinal column, head, arms, chest, etc., is transmitted entirely through the two sacro-iliac sychondroses in the position of standing, sitting, or walking. The only period at which the sychondrosis is relieved from this pressure by gravity, is in the recumbent posture.

Another common seat of the pain is at the back of the thigh, in the course of the sciatic nerve, and this situation has been made much of by several observers. This form of pain may precede any other symptoms of the disease.

There is also a considerable variety in the situations in which pain may be induced by pressure:-

1st. Pressure on the sacro-iliac sychondrosis from behind forward.

2nd. Pressure on the crest of the ilium of each side, pressing the crests towards each other.

3rd. Pressure on the symphysis pubis from before backwards.

4th. Pressure on the heel from below upwards.

5th. Pressure on the head from above downwards.

In the two original cases recorded on pages 60 - 66 intense pain was caused in the sychondrosis by pressing on the symphyses pubis from before backwards.

In the first of these two cases, there had been obscure pains in the abdomen for several months previous to the appearance of any definite symptom, and had been attributed to indigestion.

Lameness is of various kinds at the several stages of the disease. At first the patient advances the limb of the affected side in a slow cautious manner, and very gradually allows the weight of the body to rest upon it alone. The sound leg, on the other hand,, is advanced very rapidly, apparently with the object of permitting the weight of the body to rest upon the diseased limb for as brief a space of time as possible. It is obvious that this peculiar walk is a result of the pain caused while the weight of the body is transmitted through the sacro-iliac sychondrosis of the affected side.

In the first case which came under my observation, the patient adopted a peculiar attitude. She stood upon the leg of the diseased side, placed the sound leg in the stand-at-ease position, and bent the body well forwards, at the same time rotating the pelvis in such a way that she looked towards the side of the diseased joint. Both cases had a peculiar limp on walking, caused apparently by using the sound limb as a pivot, and the pelvis, with the diseased limb, were revolved round it.

All these conditions are purely results of pain. Swelling is a sign which is not by any means always present. In the case E.B. (page 60) there was a well-marked sausage-shaped swelling corresponding to the sacro-iliac sychondrosis of the affected side. In the case J.D. (page 63) there was a distinct puffiness of a circular shape just over the upper part of the sacro-iliac sychondrosis of the affected side.

Erichsen described a swelling over the articulation, from above downwards, but Naz quoted Pierre Delbet who described the swelling as transverse.

Alteration in the shape of the limb is due partly to the altered position of the pelvis, and partly, it may be, to sympathetic paralysis of the muscles in that region, such as the gluteus maximus. It may also be due, in fact, to the swelling. The limb often gets emaciated and shrunken to an extreme degree.

One sign which is especially noted by many authors is an apparent lengthening of the affected limb. The lengthening is only apparent, as the measurement from the anterior superior spine of the ilium to the external malleolus is the same on the affected side as on the sound side. This apparent lengthening has been observed by authors as early as the days of Boyer, who mentioned a lengthening of the limb of the affected side as one of the symptoms of this condition.

The explanation of this peculiar phenomenon is that the patient, in endeavouring to take the weight of the body off the affected sacro-iliac synchondrosis, throws the body to the sound side, and so raises the pelvis on the affected side. To compensate for this curve to the sound side, the head and neck are thrown to the opposite side, the result being that the spine acquires a characteristic curve with the convexity to the sound side. This characteristic condition has been remarked by many authors, especially Sayre, who gave a photograph in his work on Orthopaedic Surgery, which demonstrated this condition in a remarkable way. In the second case which came under my observation, J.D. (page 63) this characteristic curve was well-marked, but the patient, a young lady of 18, was unwilling to allow a photograph to be taken to illustrate it. Many other authors do not mention this curve at all, and even the apparent lengthening of the limb is a disputed point. Poore stated that out of 15 cases, 7 of them showed no alteration in the length

of the limb. Of the other 8, there was apparent lengthening in 3 and apparent shortening in 5. Wood says that the apparent lengthening of the affected limb is caused by sympathetic paralysis of the gluteus maximus, pyriformus and psoas muscles.

The foregoing signs and symptoms are all caused by the pain, and the attitude, the curve of the spine, etc., are adopted by the patient as the position of least pain.

There are other signs such as muscular atrophy, difficulty of defaecation, and difficulty of micturition. Boyer mentioned the fact that the parts were generally swollen, but many authors remarked a wasting of the muscles of the affected limb, notably Marsh in his Diseases of Joints, and Ridlon and Jones in the Annals of Surgery. This, however, to quote from Heath, is merely the result of disuse of the limb, and not a symptom of the disease.

Difficulty of micturition and defaecation were remarked by Sayre. Poore quotes a case of Musten, in which the lower

extremities became oedematous from plugging of the iliac vein on the left side, then that of the right side, the veins being found at the post mortem examination to be embedded in a large abscess. He also mentioned one case in which the parts were swollen, and another in which the limb was generally atrophied and wasted, as well as the muscles forming the gluteal group.

There is one other symptom which is often well marked in those cases in which the onset is gradual, and in which there is no very apparent injury, viz: a feeling of great weakness at the lower part of the back, and a general feeling of insecurity in walking and great fatigue in doing so. This symptom was especially mentioned by Barker in Holmes's System of Surgery as the first symptom of sacro-iliac disease, and preceding that of pain.

There is one other sign often well marked in advanced cases, viz: that the thigh is flexed upon the abdomen, and even in some of the slighter cases recorded there is mention of the thigh being at an angle to the body.

Abscess follows in a large percentage of cases. The swelling previously noticed may increase in size and show fluctuation on palpation. The abscess or abscesses may form in many different situations, which have been already referred to under "Pathology." With the formation of pus the temperature rises slightly, the tongue becomes furred, and the patient becomes more emaciated. There may possibly be a distinct increase in the amount of pain, dependent on pressure on a nerve.

D I A G N O S I S .

The diagnosis of a tubercular arthritis of this joint is beset with difficulties. From the literature on the subject, it appears that cases vary to a considerable degree in their symptoms.

From what is stated under "Prognosis", it is evident that an early diagnosis is particularly to be desired in this affection.

There are several conditions which may be mistaken for it, viz:-

1st. Lumbago,
2nd. Sciatica,
3rd. Neuralgia,
4th. Pott's Disease,
5th. Hip Joint Disease,
6th. Disease of the Pelvic Bones,
7th. Perityphlitis,
8th. Rheumatic Arthritis,
9th. Gonorrhoeal Arthritis.

1st. Lumbago causes pain equally at both sides of the back, whereas in sacro-iliac arthritis the pain will be confined to one side. There are one or two cases on record in which the disease existed on both sides.

By pressing the two iliac crests forcibly towards each other, a diagnosis might be made, as in arthritis there would be intense pain, whereas the pain would be slightly, if at all, aggravated in lumbago.

2nd. Sciatica is a disease of later life, whereas sacro-iliac arthritis is a disease of youth and early manhood. The lameness alone would not be diagnostic of sacro-iliac arthritis, but that peculiar condition of Scoliosis, that curving of the spine so characteristic of the affection would be absent in sciatica. Pain on pressing the iliac crests towards each other would also be absent in sciatica. In this, as in the case of lumbago, an examination of the rectum might clear up the doubt, by revealing a spot tender to the touch, corresponding to the sacro-iliac articulation of the affected side.

3rd. Neuralgia occurring in hysterical subjects is mentioned by Erichsen as one of the conditions likely to be confused with sacro-iliac disease. This will most probably occur in females, but there will be other hysterical manifestations to guide the surgeon. The pain of neuralgia would probably begin very suddenly and abate for intervals, whereas in

arthritis the pain will probably be steadfast. The pain will be independent of movement in neuralgia, whereas movement always augments the pain of sacro-iliac arthritis.

4th. Pott's Disease of the lower lumbar vertebrae may be confounded with sacro-iliac disease. The pain on pressure would be higher up in Pott's Disease than in sacro-iliac disease. Pressing the two iliac crests towards each other causes no pain in the case of Pott's Disease, whereas in sacro-iliac disease it causes intense pain in the joint. Hahn records cases in which caries of the lumbar vertebrae existed along with sacro-iliac arthritis.

5th. Hip-joint Disease elicits pain on pressure at or near the great trochanter, which is absent in sacro-iliac arthritis. Manipulation of the hip-joint causes pain in hip-joint disease, whether the pelvis be fixed or not, whereas in sacro-iliac arthritis, provided that the pelvis be fixed, the limb can be manipulated in any direction without pain being caused at the hip-joint.

The elongation of the affected limb in hip-joint disease is real, not apparent, as it is in sacro-iliac disease.

Poore considers that locomotion is more difficult in sacro-iliac disease than in hip-joint disease, and that greater relief is obtained by absolute rest in the former than in the latter. Gant believes that the marked projection

of the anterior superior iliac spine is diagnostic of sacro-iliac disease, as it does not occur in hip-joint disease.

6th. Disease of the Iliac Bones may be (according to Erichsen) confused with sacro-iliac arthritis.

Disease of the innominatum would affect the iliac crest, the acetabulum, or the tuber ischii. In the case of caries affecting the iliac crest, pain would be greater on pressure there than over the sacro-iliac sychondrosis. In the case of the acetabulum, the same diagnostic rules would apply as in hip-joint disease, as manipulation of the limb would cause pain in the hip-joint whether pelvis was fixed or not, whereas in sacro-iliac disease there would be no pain, provided the pelvis was fixed, on any movement involving the hip-joint.

7th. Perityphlitis may be mistaken for abscess in the right iliac fossa caused by sacro-iliac disease, but elevation of temperature, sickness, etc., which characterise the former should serve to distinguish that condition from sacro-iliac arthritis.

8th. Rheumatic Arthritis may be distinguished from sacro-iliac disease by other rheumatic manifestations.

9th. Gonorrhoeal Arthritis will be a sequel in this joint to affections in other joints.

P R O G N O S I S .

Most authors have given a decidedly unfavourable prognosis, but of recent years, Makins and Golding Bird have held out a much more hopeful prospect.

The prognosis must, of necessity, depend to a large extent, on the stage at which the disease has arrived, and the amount and extent of the structures involved, which can only be roughly estimated by the presence or absence of abscesses.

Sayre, Van Hook and Ridlon and Jones lay special stress on the two kinds of sacro-iliac disease, viz: the dry and the moist. In the former there is a much more favourable prognosis than in the latter. All authors have admitted that the moist form (that is, where abscess has formed) is highly dangerous to life.

There are only two well authenticated cases on record in which recovery took place without operation after an abscess

had formed. The first case was published by Hilton in his Lectures on Rest and Pain. Heath records a case in which a patient recovered after an abscess having discharged from the rectum. In Hilton's case the abscess became absorbed.

Poore stated that out of 50 cases, 23 were cured. 1 improved, 3 remained 'in statu quo', and 23 died. Out of these 23 who recovered, 9 of them had abscesses.

Ridlon and Jones attribute the frequent fatal result to the operation rather than to the disease.

Among the earlier authors, the prognosis was a very gloomy one.

Velpeau records two cases in whom he opened abscesses, with the result that in both cases they died of septicaemia shortly after.

Golding Bird believes that when disease begins in the sacrum, it is probably less hopeless than when it begins (if ever), in the ilium, and that the prognosis is much better when the disease is in the articular surfaces of the bones only.

He also believes that the prognosis will be decidedly better if an operation be performed early, and advocates a radical cure before abscesses have formed. He goes on to say "where the pain is moderate, yet persistent and recurrent, yielding, it may be, to rest, but beginning again whenever activity is resumed, we should act as in all other tubercular arthritis and remove the disease early."

Marsh is of opinion that where there is actual caries of bone there is not much chance of a cure, but that if only synovial membrane be affected a cure may be attained by scraping it away.

T R E A T M E N T .

The several treatments adopted are:-

1st. Rest,

2nd. Counter-irritation,

3rd. Extension,

4th. Aspiration,

5th. Operative.

Rest is acknowledged by all authors on the subject to be the first indication. The only method of carrying out rest effectively is in the recumbent posture.

Erichsen recommended rest in the prone position; and later on Heath, Poore and Barker all recommend rest in the early stages of sacro-iliac disease. Heath recommended in addition the use of pelvic bands, consisting of two bands passing round the pelvis and fastening to a broad pad in front of the pubes, with elastic bands passing round the thighs and fastening to the pad in front.

Lee suggests the treatment of this condition by means of strong continued compression of the pelvis laterally, which he calls "splinting the pelvis." The apparatus consists of two belts, one for day and one for night, that for the day being much more rigid than the one for the night. He recommends that these belts be worn for at least six months.

Poore states that of 22 cases cured, 10 were cured by rest in bed, and later on some form of pelvic support, 11 were cured by rest alone, and 1 by rest with a long splint.

Marsh states the treatment as "long continued rest in the horizontal position, which must be for six months to a year or more."

Counter-irritation has been in vogue since the days of Boyer, and is still used at this day, combined with rest. The older surgeons employed the actual cautery, and later on blisters were applied over the sacro-iliac synchondrosis.

In a discussion on Makins' paper read before the Clinical Society of London in March 1893, Sir Dyce Duckworth explained

how Syme was accustomed to employ the actual cautery with excellent results.

Small round blisters placed at various spots around the sacro-iliac synchondrosis have been found to answer well. Painting the surface with iodine or blistering fluid, may be employed in slight cases.

Extension may be done in two ways, viz:-

(1) In the recumbent posture.
(2) In the erect posture.

Extension in the recumbent posture is achieved by means of weights and pulleys at the foot of the bed, which may be raised higher than the head.

Extension in the erect posture is carried out by Sayre, who places the patient on crutches with a high sole on the sound foot and a weight added to the foot of the affected limb, so that extension is in this way applied.

Poore mentioned a case of a little girl of 4 years to whom he applied extension, but was obliged to stop it in six

days, owing to the pain which it caused, and which passed off whenever the extension was removed.

Wood published an article in the British Medical Journal in 1880 on the Employment of Double Extension in cases of disease and injuries of the spine and pelvic joints, in which he advocated the use of extension of both limbs in cases of sacro-iliac disease, with weights and pulleys and the foot of the bed raised on blocks, and even the use of counter-extension by means of shoulder or chin straps fixed to the head of the bed; but he particularly emphasized the fact that extension to one limb only would be injurious by increasing the elongation of the affected side already produced.

The foregoing indications of treatment can only effect a cure in cases in which no abscess has formed, in other words, in the "dry" form of the disease.

In those cases in which abscess has already formed, the pus must be evacuated. The use of the Aspirator was adopted

largely for some time, and in many cases with marked success. But success with the aspirator can only be possible provided that the bones are not involved. In those 'synovial' cases, in which abscess has been formed, the use of the aspirator would probably be followed by recovery, but should there be any caries or necrosis of the bony surfaces, it seems impossible that the mere removal of the pus could effect a cure.

Previous to the employment of the aspirator, the bistoury was used to open abscesses, but the results were often disastrous. Velpeau records two cases who died of septicaemia shortly after the opening of abscesses.

Aspiration may fail owing to the fact that there may be two abscess cavities, the one under the skin and the other under the muscles, the two communicating by a narrow channel, and only the subcutaneous one is evacuated by the aspirator.

Operative. Up to, and including the 8th edition of Erichsen's Surgery, he states that "No operative treatment is admissible"

The first operation performed for this disease was by Sayre in 1853 in America. He has not published the case, but has communicated it to Van Hook, who published it along with others in the Annals of Surgery in 1888 and 1889. The operation is referred to on page 68.

For ten years, no more radical cures were performed and at the end of that period, in 1863, Sayre again performed a radical cure with success. So that America can claim the first of the radical cures. England comes next by Golding Bird performing the operation in 1880 and again in 1882. Then France took it up in 1882 by M. Trelat performing an operation of this kind. After that, operations became much more frequent. Tiling performed two operations in 1883, but the disease was so extensive that so large a quantity of bone had to be removed that the patient died.

Marsh operated successfully in 1886.

In 1887 Van Hook in America, Gant in England, and Perier in France, all performed similar operations. Then Makins in

1888, Collier in 1889, Beale in 1892, and Gould in 1893, all performed radical cures.

The operation may be performed in various ways. Golding Bird described his operation thus:-

> "A semicircular flap of skin and subcutaneous tissue over the area of the joint, having its convex margin corresponding to the posterior edge of the ilium, is dissected up and thrown forwards, and the underlying glutei muscles are similarly detached. The bone being thus freely exposed, a large trephine is applied at the root of the posterior inferior iliac spine, and in a line drawn from the top of the spine to the junction of the anterior with the middle third of the iliac crest. This line lies in the axis of the auricular surface of the joint. The disc of bone removed should extend down to the joint. The bone removed should be the iliac surface of the joint. When all visible disease is removed, the ilium should be prised off the sacrum with an elevator, to allow the introduction of a Volkmann's spoon."

He strongly recommends that the operation be performed early, whether there is evidence of suppuration or not. He goes on to say, "where pain is moderate yet persistent and

recurrent, - yielding, it may be, to rest, but beginning again when activity is resumed - we should act as in all other tubercular arthritis, and remove the disease early." He condemns the practice of following up the sinuses as quite useless, and says that "no splint is necessary after the operation."

General principles of treatment include the administration of Cod Liver Oil, Malt, or Hypophosphites, plain nourishing food, and fresh air. The latter is best achieved by lifting the patient on to a perambulator of sufficient length to enable him to maintain the recumbent position absolutely.

C O N C L U S I O N S .

I. Sacro-iliac disease is a rare affection, but not so rare as is commonly supposed.

The literature upon the subject is chiefly found in the French language.

II. Of the several forms of disease involving the joint, the Tubercular variety is the most common.

It occurs almost equally in the two sexes, and is chiefly found in youth and early manhood.

III. Careful consideration of the etiological factors points conclusively to Traumatism acting upon a Tubercular diathesis as the fundamental cause.

IV. The Pathology of this condition in the early stages is unknown owing to the fact that no post mortem examination has, so far, been recorded.

In the later stages, disorganisation of all the structures forming the synchondrosis has been found.

In this respect Tubercular disease of the Sacro-iliac joint in no wise differs from that found in other Tubercular joint affections.

V. The Diagnosis in the early stages is difficult, where commencing disease of the joint has to be distinguished from Neuralgia, Lumbago, Hip-joint disease and Sciatica.

In the advanced stages Scoliosis, lameness, distortion and abscess formation are usually sufficient to render the diagnosis conclusive.

VI. The Prognosis is favourable as regards recovery, provided that the condition be early recognised and promptly treated: favourable also as regards life so long as there is no Tubercular disease in other organs.

VII. The Treatment in the early stages consists of absolute rest in the recumbent posture for a period of at least three months.

The method of extension recommended by Sayre seems open to many objections.

In the latter stages, with abscess formation, it is necessary to open the joint and remove sequestra.

NOTES OF

ORIGINAL CASES.

Case I. E.B. Female, age 12.

Called to see her on October 6th 1893. The Mother says that she stoops very much as she walks, and complains of pain in the lower part of the back. She also says that for a year or two she has complained of slight pains in the abdomen, which did not appear to be influenced in any way by food. The patient is a bright, fair-haired, blue-eyed girl. The relatives on her father's side are scrofulous.

On stripping her she stands on the left leg with the right in the stand-at-ease position, the body thrown well forward and bent at an angle with the legs. On being asked to stand on the right leg, she fixes the foot of the left one firmly, and then draws back the right leg before standing on it, and leaves the left leg well forward. There is marked tenderness and pain over the left side of the sacrum, and over the line of the left sacro-iliac joint. She complains of constant pain on walking. There is also marked pain on pressure all round the crest of the ilium on the left side, and down the groin to the symphysis pubis. There is also marked pain on pressing the two iliac crests towards each other.

Ordered administration of Cod Liver Oil and Iron and absolute rest on the back, lifting her on to a perambulator in that position, so that she could have fresh air.

Oct.11th. Pain rather worse.

Oct. 12th Advised painting over sacro-iliac joint with Tincture of Iodine night and morning.

Oct.29th. Swelling to be seen just over the left sacro-iliac synchondrosis, extending upwards and downwards about 1½ inches in all.

Oct.30th. Still pain. Fixed the leg and body in a long splint, and ordered her not to be moved in any way for at least a fortnight, but to lift mattress bodily on to perambulator every day and take her out.

Dec.22nd. Took off splint and found her absolutely free from pain on pressure while lying, but did not allow her to attempt to stand at all. Allowed her to remain in bed without splint, still being taken out every day.

Dec.27th. Has been gradually increasing the quantity of Cod Liver Oil taken.

Jan.31st. 1894. No pain on pressure over sacro-iliac joint, nor on pressing the two ilia together. On making her stand up I found that she immediately resumed her old position namely, with the right leg bent in the stand-at-ease position, and the left one straight and fixed. There was very slight pain on pressure over one spot of very limited area in the left groin. Her general health appears much better than it has been for years. She has gained flesh considerably and looks stouter and healthier than before.

March 1st. I advised absolute rest for another month, and then gradual movements made during part of the day, absolutely recumbent posture during the rest of the day. I restricted her from all active exercises for one year more, during which time she was very well.

Oct. 1895. Two years after commencement. She is very well now, indeed, has been playing tennis all the summer.

I believe that this case in June 1896, when out of my care, had a return of the pain and tenderness, and was operated on successfully by Dr. Noble-Smith.

Case II. J.D. Female. Age 18.

Came to see me on September 24th,1895, complaining of a dull aching pain at the lower part of the back. There is slight swelling in the region of the right sacro-iliac joint and great pain on pressure there, also great pain there when pressure is made with a hand over each trochanter, pressing them towards each other, and on pressure on the symphysis pubis from before backwards. When standing with the heels together, the right knee straight and the left knee bent, she is in great pain and cannot remain in that position more than a second. With the left knee straight and the right knee bent she is more comfortable. Standing with the left leg straight and the right foot and leg thrown forward, she is very unsteady, and could not remain that way long, but with the right leg straight, and the left foot and leg thrown forward, she is more comfortable. There is a history of injury last July, by falling, when walking on a roof, through a glass window, only the right leg going through, and the sacrum coming in violent contact with the frame of the window. After that accident there was throbbing pain for a few days, which, however, soon passed off, and she was quite free from pain until a fortnight ago, when the dull aching pain commenced.

On being stripped, the right shoulder was found to be lower than the left, and the spine curved outwards to the left side. The right leg appeared to be elongated, but on measurement I found that it was identically the same length as the left.

On asking her to walk she did so by revolving the right side round the left, then jerking the left leg rapidly forward.

Ordered absolute rest in bed. Paint the lower part of the back with Tincture of Iodine night and morning, and take Cod Liver Oil thrice daily.

October 1st. Pain greater. Complains of sickness from Cod Liver Oil. She complains of numbness down the right leg.

Ordered Extract of Malt daily instead of Cod Liver Oil. Put several small blisters over the sacro-iliac synchondrosis. Great pain on pressing the ilia together, and on pressing on the right iliac crest right round to the symphysis pubis.

October 14th. Pain much less over sacro-iliac joint, but still great over Poupart's ligament and at the symphysis pubis. She is taken out regularly in a carriage, lying flat.

October 21st. Pain less.

October 25th. Still tender over Poupart's ligament, but nowhere else. Still has irritable feelings down leg.

October 28th. Complained of pain in the right iliac bone, and tender on any pressure near there. She had just been

doing her hair, which was probably the cause of the pain.

November 11th. Still has pain in joint on pressing the two iliac bones together, also at symphysis pubis.

November 15th. Pain less on pressure.

November 22nd. Feels much better generally, and tenderness on pressure slightly less.

December 12th. Made to stand up on the floor supported under the arms by two people, but the pain referred to the right sacro-iliac joint was so great that she was put back to bed immediately.

December 15th. Has had slight pains in the thighs and numbness down the right leg since I tested her up.

December 24th. Made to get out of bed again, and supported by someone on each side holding her under the arms. She was unable to stand on the right leg with the left one bent, but she could stand with the right leg bent, and the left one straight for a few seconds, at the end of which time she complained of pain in the situation of the synchondrosis again.

December 27th. Has had numbness of right leg since I tested her on December 24th.

January 7th. 1896. Tested her out of bed again. Same as last time. Allowed her to turn about in bed now.

January 18th. Allowed her to sit up in bed supported by pillows for an hour.

February 1st. Feels much stronger. Tenderness on pressure considerably less. Allowed her to sit up in easy chair for two hours a day.

February 18th. Can stand on either leg without pain.

July 20th, 1896. With the exception of one slight return lately, due to overtiring herself, she has made steady progress. There is no tenderness now on pressure at all. She is still made to lie down on her back for three hours each afternoon. There has always been a slight return of the pain at the menstrual periods.

She is still forbidden to do any active exercises except walking, and almost always lies down for about one and a half hours in the afternoon.

She is in better health now than she has ever been before.

ABSTRACT OF PREVIOUSLY RECORDED CASES.

	Surgeon	History	Treatment
1.	Hahn (1833) in Thèse of Delens 1872. Personal Translation	Male, age 19. Death,	P.M.; sacro-iliac cartilage destroyed, bones carious, also bodies of 2nd., 3rd., 4th. lumbar vertebrae.
2.	The same, 1833. Personal Translation	Male, age 20 Death.	P.M.; Cartilage destroyed sacrum carious also 3rd., 4th., and 5th lumbar vertebrae.
3.	The same, 1833 Personal Translation	Male, age 26 Death.	P.M.; Cartilage destroyed muscles degenerated, sacrum carious.
4.	Nichet (1834) in Thèse of Delens 1872 Personal Translation	Male 18 years, Pain lower dorsal region and knees for 14 years. Pain & swelling in buttock. Abscess opened spontaneously. Death.	P.M. Periosteum raised by Tubercular matter. Cartilage destroyed, Sacrum carious also lumbar vertebrae.
5.	Courty (1846) in Thèse of Delens 1872 Personal Translation	Male, age 17 Death.	P.M. Caries of the sacrum extending to the sacro-iliac synchondrosis with abscess.
6.	Larrey (1852) in Thèse of Delens 1872 Personal Translation	Male. Pain started by jolting of caisson. Pain on walking and on pressing iliac crests together.	Rest and counter-irritation. Cured.

	Surgeon	History	Treatment
7.	Larrey (1852) in Thèse of Delens 1872 Personal translation	Male. Persistent pain in hip. Lame. Pain on pressure over sacro-iliac synchondrosis.	Counter-irritation and a girdle to fix the hips. Cured.
8.	Sayre (1853) in Van Hook in Annals Of Surgery. 1888.	Male, age 2½. Abscess in lumbar region after a fall. Opened. Sent to country. Got worse.	Incision over joint, which was opened. Cartilage cleared away. Diseased bone scraped. Cured.
9.	Bellingham (1854) in Dublin Medical Press.	Female, age 26. For six weeks pain in lumbar region, and weakness of legs.	Died in three months. P.M., Cartilage eroded, bone bare and carious. Cancer of pylorus.
10.	Hilton (1857) in "Rest and Pain."	Male, age 42. Pain in hip for six weeks	Rest in bed for four months, then partial rest for two months. Cured.
11.	Hilton (1860) in "Rest and Pain"	Male. Pain in calf after falls. Thigh flexed, could not stand or walk. Pain on pressure over synchondrosis.	Rest in bed for two months, then mechanical rest. Cured.
12.	Hilton (1860) in "Rest and Pain"	Male, age 5. Lameness.	Rest for 3 months, then moderate exercise. Cured.

	Surgeon	History	Treatment
13.	Sayre (1863) in Van Hook in Annals of Surgery 1888.	Male, age 23. Apparent lengthening of limb. Lordosis Abscess at posterior part of iliac crest.	Abscess opened above joint. Necrosed bone gouged away. Then extension in bed. Later on raised boot on sound side and weighted boot on affected side, and crutches. Cured.
14.	Sayre (1863) in Van Hook in Annals of Surgery 1888.	Female, age 61, Seized with pain in lumbar region. Then in bed for 6 years. Constant pain in calf.	Actual cautery. Blister, in bed with extension for several months. Cured.
15.	Sayre (1866) in Van Hook in Annals of Surgery 1888.	Male, age 5. Fell off hobby-horse. Pain in knee a few weeks after.	Actual cautery. Rest in bed and then wheel crutch with high boot on sound side and weighted boot on affected side Cured.
16.	Sayre (1866) in Van Hook in Annals of Surgery 1888	Male, age 13, injured by jump on heel. Pain started immediately. Apparent lengthening.	Actual cautery. Rest in bed with extension. Cured.
17.	Sayre (1866) in Van Hook in Annals of Surgery 1888	Male, age 11. Great pain from striking lower part of back against piece of wood in swinging. Partial paralysis.	Actual cautery. Rest in bed with extension, then high shoe on sound limb and weighted shoe on affected limb and crutches. Cured.

	Surgeon	History	Treatment
18.	Sayre (1867) in Van Hook in Annals of Surgery 1888.	Female, age 23. Fall. Had been treated for hip-joint disease.	Actual cautery. Rest in bed with extension for 6 months, then on crutches with high shoe on sound sid and weighted shoe on affected limb. Cured.
19.	Rey (1873) in Thèse of Provendier 1887. Personal translation	Male. Fall on back. Pain in course of sciatic nerve and spermatic cord.	Death. P.M.; Cartilages disappeared also ligaments. Bone stripped and covered with granulations.
20	Stoiesco (1873) in Thèse of Provendier 1887. Personal translation	Female, age 35. Fall. Pain at posterior inferior iliac spine. Lameness, abscess below buttock. Leg and thigh flexed. Pain on pressing sacrum, and iliac crests.	Aspirated several times. Oedema Death. P.M.; Muscles infiltrated, Sacrum carious Ligaments, synovial and cartilage destroyed.
21.	Sayre (1874) in Van Hook in Annals of Surgery 1888.	Male, age 30. History of injury.	Actual cautery. Rest in bed with extension at night. In daytime on crutches with high shoe on sound limb and weighted shoe on affected limb. Cured.
22.	Bounaix (1874) in Thèse of Paris Personal translation	Male, age 36. Pain in loins down to knee. Abscess at great trochanter.	Aspirated. Then spontaneous opening, foetid pus. Death.

	Surgeon	History	Treatment
23.	Mason (1875) in Van Hook in 1888.	Male, age 61. Sudden pain in outer and posterior thigh to knee. Soft tumour on front of thigh below Poupart's ligament.	Aspirated. Diarrhoea. Death.
24.	Fagan (1875) in the Lancet	Female, age 4. Fall. Fluctuating swelling in sacral and gluteal regions.	Aspirated several times then pressure over sac. Cured.
25.	Heath (1875) in the British Medical Journal 1876	Male. Sciatic pain. Could not stand. Swelling over the synchondrosis, fluctuating. Keeps hip flexed. Pain on pressing iliac crests.	Aspirated twice and then fitted with a tight belt on.
26.	Heath (1875) in the British Medical Journal 1876	Female. Pain in synchondrosis, over abdomen and down thigh. Fluctuating swelling in iliac fossa.	Aspirated several times. Later on abscess discharged per rectum and she recovered.
27.	Heath (1876) in the British Medical Journal 1876	Female, age 25. Lameness. Pain in groin and on pressing trochanter or heel. Abscess in iliac fossa.	Aspirated. Fitted with belt having two pads over pubes and perinoeal bands.

	Surgeon	History	Treatment
28.	Poore (1877) in the American Journal of Medical Science, 1877.	Female, age 4. Lameness. Pain in knee on standing, also on pressure on synchondrosis and on crest of ilium. Threw weight on sound side.	Rest. Extension, but latter had to be stopped as it caused so much pain. Case left.
29.	Golding-Bird (1880) in "Transactions of the Clinical Society of London," 1895.	Male, with advanced sacro-iliac disease.	Trephined the joint and cleaned out sequestra. Same in a year again. Sinus remained after.
30.	Golding-Bird (1880) in "Transactions of the Clinical Society of London,"1895.	Male, age 27 with advanced sacro-iliac disease.	Opened up sinus till reached joint. Sequestra removed. Sinus remained.
31.	Golding-Bird (1882) in "Transactions of the Clinical Society of London," 1895.	Male, age 26, with advanced sacro-iliac disease.	Opened up sinus, scraped joint. Removed sequestra. Septicaemia. Death.
32.	Ollier (1882) in Thèse of Naz, Paris 1896. Personal translation	Female, age 39. Fall sitting, pain in iliac fossa and lumbar region. Fistula at posterior superior iliac spine and one at middle of iliac crest. Swelling over synchondrosis.	T. incision. Periosteum detached. Ilium trephined next to joint. Fistula remained.

	Surgeon	History	Treatment
33.	Ollier (1882) in Thèse of Provendier 1887. Personal translation	Male, age 12. Fall. Pain in 6 months at knee. Pain on pressing iliac side of synchondrosis.	Incision posterior Gouge and put finger through into pelvis. Cured.
34.	Trelat (1882) in Thèse of Provendier 1887. Personal translation	Female, age 29. Pains in buttock, thigh and leg. Abscess over synchondrosis.	Opened abscess. 2nd. trephined joint removed sequestra. Improved.
35.	Marsh (1886) in "Diseases of Joints."	Female, age 32. Fistulous openings leading to joint.	Joint opened. Granulations scraped away. Sponged with Zinc Chloride. Cured.
36.	Delorme (1886) in Thèse of Provendier 1887 Personal translation	Male. After false step pain in buttock, hip and thigh. Swelling from buttock to popliteal space. Pain on pressing posterior inferior iliac spine.	Incised vertically scraped cavity. Removed debris of structures of joint. Fistula remained. 2nd. Incised transversely. Scooped tubercular debris out of post-rectal abscess by finger through joint. Cured; then took Orchitis.
37.	Gant (1887) in the Lancet 1887.	Male, age 36. Fall. In 18 months fluctuating swelling on left side of sacrum. Apparent elongation, abduction and eversion. Anterior superior iliac spine lower and projecting.	Incision. Joint gouged out. Abscess cavity scraped with Volkmann's spoon. Cured.

	Surgeon	History	Treatment
38.	Gant (1887) in the Lancet 1887.	Female, age 19. Swelling over synchondrosis. Apparent lengthening and eversion. Anterior superior iliac spine projecting .	Abscess opened. Joint and pyogenic membrane scraped, Cured.
39.	Makins (1887) in the "Transactions of the Clinical Society of London,"1893.	Male, age 25. Pain in line of sciatic nerve, and on pressing iliac crests or trochanters together. Anterior superior iliac spine raised. Hip flexed and adducted.	Crucial incision. Trephined joint. Scraped away granulations and carious bone (sacrum). Cured.
40.	Hattute (1887) in Thèse of Provendier 1887. Personal translation	Sacro-iliac disease. Death.	P.M. Muscles soft, full of foetid pus. Abscess on posterior surface of sacrum and in joint. Ligaments jellified. Periosteum of both bones destroyed near joint, also cartilage. Bones friable.
41.	Tiling,in Van Hook in Annals of Surgery, 1888.	Male, age 6. Lameness. All movements painful. Gluteal region swollen and tender. Projection at synchondrosis felt per rectum.	Opened abscess which discharged pus for a month then healed in about a year.

	Surgeon	History	Treatment
42.	Tiling, in Van Hook in Annals of Surgery 1888 .	Female, age 26. Pain in lower back and lameness. Abscess broke then thigh flexed, adducted, rotated inwards. Pressure over joint caused pain down to foot. Small swelling below anterior inferior iliac spine.	At operation no carious bone found. Rest after operation. Cured.
43.	Musten in Van Hook in Annals of Surgery 1888.	Male, age 25. Fistulae, oedema of left leg.	Abscess opened. Suppuration last 12 months then died of exhaustion.
44.	Collier in the Lancet 1889.	Female, age 38, Pain in hip and lameness for 4 years since lifting heavy weight . Thigh flexed on abdomen. Pain on coughing, walking, sitting and micturition. Pain on pressing over synchondrosis and iliac crests.	Curved incision 8 in. long exposed joint. Bone denuded with elevator. Trephined. Granulation tissue and debris removed. Dead bone removed with gouge and mallet. Swabbed with Zinc Chloride. Cured.
45.	Lee in Transactions of the American Orthopaedic Association 1890.	Female. age 24. Pain in right iliac fossa after fall. Peculiar gait.	Fixed pelvis firmly. Improvement.
46.	Lee in Transactions of the American Orthopaedic Association, 1890	Female, age 51. Pain in iliac fossa after fall (6 years before) then in back extending to thigh and foot. Spine curved. Peculiar gait	Fixed pelvis firmly. Improvement.

	Surgeon	History	Treatment
47.	Makins (1890) in the Transactions of the Clinical Society of London 1893	Male, age 3. Run over 10 months ago. Pain in leg. Swelling over the synchondrosis for a month. Lameness. Pain on pressing iliac crests together.	Posterior incision. Joint opened and scraped, also abscess cavities. Fragments of bone and cartilage and caseating granulations removed. Sinus remained.
48.	Makins (1891) in the Transactions of the Clinical Society of London, 1893.	Male, age 3. Swelling in loin for 7 months. Pain for 2 weeks. Swelling fluctuates.	Vertical incision. Sequestra, carious bone and caseating granulations scraped away. Cured.
49.	Duplay (1891) in Thèse of Naz 1896. Personal translation	Male, age 23. Pain in leg and thigh. Fluctuating swelling in gluteal region.	Puncture. 2nd incision and bone scraped 3rd. incision, opened diverticulae with gouge and mallet. Sequestra removed. Fistula remained. Pain still present.
50.	Lannelogue (1891) in Thèse of Naz 1896. Personal translation	Male, age 8. Abscess. Symptoms for a year.	Punctured. 2nd. incision, bone scraped. Death from Diphtheria. P.M.; Tubercular focus surrounded by sclerosed tissue.
51.	Lee (1890) in the Transactions of the American Orthopaedic Association 1891.	Female, age 53. After fall fatigue in walking. Ache lumbar and sacral and in course of sciatic nerve Scoliosis .	Rest with pelvic bands. Scoliosis less, walk better.

	Surgeon	History	Treatment
52.	Lee (1891) in the Transactions of the American Orthopaedic Association 1891.	Female, age 34. Fall, pain over limb. Pain on pressure over synchondrosis.	Pelvic bands to splint the pelvis.
53.	Beale in the Lancet 1893.	Male, age 30, with several gluteal sinuses.	Opened up fistulae. Counter opening through sciatic notch on other side. Sequestrum removed. Other sinuses scraped and drained after being laid open.
54.	Golding-Bird (1893) in the Transactions of the Clinical Society of London, 1895.	Male age 29. Sciatica and pain on pressure over joint.	Sequestra, cartilage, and granulation tissue scraped off sacral aspect of joint. On prising bones asunder pus came from two sources. Cured.
55.	Golding-Bird (1893) in the Transactions of the Clinical Society of London 1895.	Female, age 30. Fall on back. Pain in lumbar region and on pressing posterior inferior iliac spine.	Opened joint which had adhesions of repair and evidence of disorganization in sequestra of cartilage. Cured.
56.	Golding-Bird (1894) in Transactions of the Clinical Society of London 1895.	Female, age 14. Pain in synchondrosis for a year. Lameness. Pain on pressure at anterior iliac spine and still greater at posterior inferior iliac spine.	Opened joint removed lymph, granulation tissue and debris of cartilage. Cured.

	Surgeon	History	Treatment
57.	Gould in Makins in Transactions of the Clinical Society of London, 1893	Female age 24 with abscess.	Tapped abscess twice then scraped and cleaned the cavity. Cured.
58.	Gould in Makins as above	Male, age 60. Two buttock abscesses only the upper in connection with joint.	Joint scraped and cleaned out. Sinus remained.
59.	Gould in Makins as above	Female, age 30, with abscess.	Joint opened, dead bone removed. Death. P.M.; Large part of sacrum and ilium carious.
60.	Delbet (1894) in Thèse of Naz 1896. Personal translation	Male, age 33. Pain in gluteal region with sciatica. Swelling in gluteal region broke and left a fistula.	Incision. Pus escaped, sac scraped, granulations removed, ilium scraped. Death.
61.	Delbet (1894) in Thèse of Naz 1896. Personal translation	Male, age 46. Pain in left lumbo-sacral region and course of sciatic nerve. Gluteal swelling is fluctuating and painless.	Transverse incision over sac. Sac scraped Granulations and sequestra removed. Sacrum and ilium scraped. Death.
62.	Delbet (1894) in Thèse of Naz 1896. Personal translation	Male, age 37. Pain in sciatic region and over synchondrosis, lessened when abscess came in lower lumbar region.	Incision. Sac scraped. Bones scraped with chisel and mallet. Debris removed. Fistula remains.

	Surgeon	History	Treatment
63.	Delbet (1895) in Thèse of Naz 1896. Personal translation	Male, age 39. Pain in gluteal and sciatic regions after fall. Pain on pressing upper part of the synchondrosis. Fluctuating swelling in left lumbar region	Punctured the incision (horizontal) Sac scraped, sequestrum removed. Bones scraped with gouge. Fistula remains.
64.	Delbet (1895) in Thèse of Naz 1896 Personal translation	Male, age 28. Pain and swelling of thigh, Could not sit or stand. Swelling in lumbo-sacral region.	Vertical incision. Sac scraped. Trephined, and removed granulations and sequestra. Fistula remains.
65.	Delbet (1895) in Thèse of Naz 1896. Personal translation	Male, age 25. Pain in buttock and thigh, then fluctuating swelling in lumbo-sacral region, parallel with synchondrosis.	Incision. Trephined. Cleaned and scraped osseous cavities. Tubercular debris removed. Fistula remains.
66.	Judge Baldwin in the British Medical Journal, 1896.	Female, age 26. After parturition pain at bottom of back, also in walking, not in sitting. Pain on pressing iliac crests together. Swelling in thigh. Lameness. Pain on pressing over synchondrosis.	Front abscess opened. Incision (Golding-Bird) Chiselled rotten bone. Put drainage tube through hole after joint removed. Tube placed in front cavity, washed with Zinc Chloride. Cured.

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F I N I S .
